

REMARKS

Applicants have carefully considered the September 2, 2005 Office Action, and the following remarks together with the accompanying Declaration under 37 C.F.R. § 1.132 are presented in a bona fide effort to address all issues raised in that Action and thereby place this case in condition for allowance. Claims 1-17 are pending in this application. Claim 16 has been withdrawn pursuant to 35 U.S.C. § 121.

Initially, Applicants request consideration of the Information Disclosure Statement submitted on December 15, 2005. Each of the items cited in the Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the Information Disclosure Statement in accordance with 37 C.F.R. 1.97(e)(1).

REJECTION UNDER 35 U.S.C. § 103(a)

Claims 1-15 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Zeng et al., "*In situ* epitaxial MgB₂ thin films for superconducting electronics", *Nature Materials*, vol. 1, 2002, pp 1-4 (hereinafter "Zeng"), in combination with Blank et al., "Superconducting Mg-B films by pulsed-laser deposition in an in situ two-step process using multicomponent targets", *Appl. Phys. Lett.*, vol. 79, 2001, pp 394-396 (hereinafter "Blank") or T. He, R. J. Cava and J. M. Rowell, "Reactivity of MgB₂ with common substrate and electronic materials", *Appl. Phys. Lett.*, vol. 80, 2002, pp 291-293(hereinafter "He"). The rejection is traversed and it is respectfully submitted that these claims are patentable over the cited references.

In the Office Action at page 3, the Examiner admitted that Zeng fails to teach the use of a substrate consisting essentially of silicon, but nevertheless, asserted that either Blank or He

teaches a variety of substrates for electronic application including Si, SiC Al₂O₃ and SrTiO₃ (STO). The Examiner merely concluded that substituting one known substrate for another would have been obvious to one of ordinary skill in the art, with the expectation of achieving similar results.

Applicants submit that the Examiner did not discharge the initial burden of establishing the requisite motivation to support a *prima facie* case of obviousness under 35 U.S.C. § 103. Applicants stress that the requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 requires not only a suggestion but a reasonable expectation of success as to a particular benefit. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Obvious to try is not the standard. *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir. 1988). Applicants submit that the only basis for such motivation is found in Applicants' disclosure, which is forbidden territory on which the Examiner may excavate for the motivational element. *Panduit Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 227 USPQ 337 (Fed. Cir. 1985). Accordingly, the rejection under 35 U.S.C. § 103 is not legally viable for at least this reason.

At page 4 of the Office action, the Examiner further asserted that claims 9, 13-15 and 17 recite the step of maintaining the pressure of the vapor within the specified processing parameters of the recited equation, but the Examiner considered that the pressure of the vapor is a “result effective” variable that is optimized by one skilled in the art through routine experimentation. Applicants respectfully traverse. The Examiner invited Applicants to submit a showing of unexpected results regarding the claimed vapor pressure if Applicants disagreed with the Examiner’s conclusion.

Applicants submit that the Examiner has improperly ignored the express limitations of claims 9, 13-15 and 17. It is legally erroneous to ignore any claim limitation. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). The Examiner has not discharged the initial burden by proffering any objective evidence to support the conclusion that maintaining the pressure of the vapor within the claimed processing parameters would have been obvious. Contrary to the Examiner's assertion, none of the applied references provide any teaching or suggestion that the claimed vapor pressure can vary from the disclosed values and the prior art does not motivate one having ordinary skill in the art a reason to vary the vapor pressure in one direction or another to produce an expected desirable result. It is well established that prior to asserting that the claimed limitation as to the parameter would have been obvious, the Examiner must first establish that the parameter to be modified is an art-recognized, result-effective variable. *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); *In re Yates*, 663 F.2d 1054, 211 USPQ 1149 (CCPA 1981); *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). The Examiner, however, has failed to establish that the claimed step of maintaining the pressure of the vapor within the recited processing parameters is an art-recognized, result-effective, variable. Thus, the Examiner cannot assert that optimizing this parameter would have been obvious to one having ordinary skill in the art. In view of the foregoing, the requisite fact-based motivation to maintain the vapor pressure as claimed has not been established. It is, therefore, improper, as a matter of due process, to attempt to shift the burden to the Applicant. Absent a *prima facie* case of obviousness, no rebuttal evidence is required. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993).

Nevertheless, Applicants have submitted an executed Declaration under 37 C.F.R. 1.132 by Zi-Kui Liu, a co-inventor of the present application. The Examiner's attention is directed to the fact that the first named inventor of the present invention is a co-author of the Zeng publication. Applicants submit that for the reasons set forth in the attached Declaration, the deposition of a MgB₂ thin film on a substrate consisting essentially of silicon would not occur with the processing conditions described by Zeng.

As stated in the Declaration, Zeng's disclosed methodology is directed to a hybrid physical-chemical vapor deposition of a magnesium diboride (MgB₂) thin film on SiC. Zeng fails to disclose or suggest the above described processing window of the presently claimed subject matter. Zeng discloses that a very high magnesium vapor pressure is required in order to keep the MgB₂ phase thermodynamically stable at elevated temperatures. Moreover, Zeng explains that because of the relatively high gas pressure and the flow pattern of the carrier gas in the reactor, the vapor from the heated pure Mg results in a high Mg vapor pressure near the substrate. Therefore, as stated in the Declaration, the Examiner's proposed combination of using a substrate consisting essentially of silicon by the method of Zeng would result in the reaction of magnesium with silicon and silicon oxides and would lead to undesirable magnesium-silicon and magnesium-silicon-oxide compounds that contaminate the silicon surface. However, as described in the present claimed subject matter, the magnesium boride film is substantially free of magnesium-silicon contaminates between the surface consisting essentially of silicon and the magnesium boride film.

In view of the foregoing Remarks and the accompanying Declaration, Applicants submit that the present claims are patentably distinct over the applied art and in condition for allowance. Reconsideration and withdrawal of the rejection are respectfully solicited.

It is believed that all pending claims are now in condition for allowance. Applicants therefore respectfully request an early and favorable reconsideration and allowance of this application. If there are any outstanding issues which might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call Applicants' representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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